

### SUPPORT FOR THE AMENDMENT

This Amendment amends Claims 1-3; and adds new Claims 7-13. Support for the amendments is found in the specification and claims as originally filed. In particular, support for the amendments is found in the specification at least at page 6, lines 21-25, and page 7, line 19 to page 8, line 1. No new matter will be introduced by entry of these amendments.

Upon entry of these amendments, Claims 1-13 will be pending in this application. Claim 1 is a dependent.

### REQUEST FOR RECONSIDERATION

Applicants respectfully request entry of the foregoing and re-examination and reconsideration of the application, as amended, in light of the remarks that follow.

Applicants thank the Examiner for the courtesies extended to their representative during the personal interview on September 17, 2008.

As discussed in the personal interview, the present invention is directed to a process for producing olefin by catalytic cracking of hydrocarbon material with the use of a specific penta-sil zeolite catalyst comprising one or more rare earth elements and at least one of manganese and zirconium. ZSM-5 is preferable as the zeolite. Specification at page 1, lines 7-11; page 5, lines 4-9; page 6, lines 18-19.

Claims 1-6 are rejected under 35 U.S.C. § 103(a) over WO 00/31215 ("WO-215") and EP 0 210 599 ("EP-599").

WO-215 discloses heavy hydrocarbon feeds are catalytically cracked by contacting with a catalyst containing ZSM-5. However, WO-215 fails to suggest the independent Claim 1 limitation of "a catalyst comprising a penta-sil zeolite comprising one or more rare earth elements". The Office Action at page 3, line 16 states that "WO[-215] fails to disclose a catalyst including a rare earth element". WO-215 also fails to suggest Mn.

EP-599 discloses catalyst including mixed oxides of manganese and at least one metal selected from the group consisting of lanthanum series metals and niobium. EP-599 at page 3, lines 20-22. However, EP-599 fails to suggest zeolite, penta-sil zeolite, or penta-sil zeolite containing Zr.

EP-599 discloses:

[T]he art of catalytic conversion of hydrocarbons to olefins remains highly unpredictable. EP-599 at page 2, lines 35-36.

Any *prima facie* case of obviousness based on the cited prior art is rebutted by the significant improvement in n-hexane conversion ratio that is achieved by the invention of independent Claim 1, in a process for producing olefin by catalytic cracking of hydrocarbon material, by "employing a catalyst comprising a penta-sil zeolite comprising one or more rare earth elements and at least one of manganese and zirconium". This is demonstrated in the specification at page 16, Tables 1-2. The data in Tables 1-2 is rearranged in Tables A, B and C below.

Table A

	Catalyst	n-hexane conversion ratio	
		(%)	Increase over Unmodified HZSM-5
Unmodified	HZSM-5	4.2	
C-Example 1	La / HZSM-5	4.5	0.3
C-Example 4	Zr / HZSM-5	5.5	1.3
Sum of Increase			1.6
Example 2	La-Zr / HZSM-5	12.2	8.0

("C-Example" = Comparative Example)

Table B

	Catalyst	n-hexane conversion ratio	
		(%)	Increase over Unmodified HZSM-5
Unmodified	HZSM-5	4.2	
C-Example 1	La / HZSM-5	4.5	0.3
C-Example 3	Mn / HZSM-5	6.5	2.3
Sum of Increase			2.6
Example 1	La-Mn / HZSM-5	15.5	11.3

("C-Example" = Comparative Example)

Table C

	Catalyst	n-hexane conversion ratio	
		(%)	Increase over Unmodified HZSM-5
Unmodified	HZSM-5	4.2	
C-Example 1	La / HZSM-5	4.5	0.3
C-Example 3	Mn / HZSM-5	6.5	2.3
C-Example 4	Zr / HZSM-5	5.5	1.3
Sum of Increase			3.9
Example 3	La-Mn-Zr / HZSM-5	15.0	10.8

("C-Example" = Comparative Example)

As shown in Table A, unmodified HZSM-5 results in a n-hexane conversion ratio of 4.2%. Comparative Example 1 with a La/HZSM-5 catalyst has a n-hexane conversion ratio of 4.5%, an increase over unmodified HZSM-5 of 0.3% ( $= 4.5\% - 4.2\%$ ). Comparative Example 4 with a Zr/HZSM-5 catalyst has a n-hexane conversion ratio of 5.5%, an increase over unmodified HZSM-5 of 1.3% ( $= 5.5\% - 4.2\%$ ). The sum of the increases is 1.6% ( $= 0.3\% + 1.3\%$ ).

In contrast, Example 2 with a La-Zr/HZSM-5 catalyst has a n-hexane conversion ratio of 12.2%, an increase over unmodified HZSM-5 of 8.0% ( $= 12.2\% - 4.2\%$ ).

Table A shows that the La-Zr/HZSM-5 catalyst exhibited an increase in n-hexane conversion ratio over unmodified HZSM-5 that was significantly higher than the sum of the increases exhibited by each of the La/HZSM-5 catalyst and the Zr/HZSM-5 catalyst.

Table B shows that the La-Mn/HZSM-5 catalyst exhibited an increase in n-hexane conversion ratio over unmodified HZSM-5 that was significantly higher than the sum of the increases exhibited by each of the La/HZSM-5 catalyst and the Mn/HZSM-5 catalyst.

Table C shows that the La-Mn-Zr/HZSM-5 catalyst exhibited an increase in n-hexane conversion ratio over unmodified HZSM-5 that was significantly higher than the sum of the increases exhibited by each of the La/HZSM-5 catalyst, the Mn/HZSM-5 catalyst and the Zr/HZSM-5 catalyst.

In the present invention, Ce or mixtures of rare earth elements provide the same superior effect as La. See attached Declaration Under 37 CFR 1.132.

The cited prior art fails to suggest a significant improvement in n-hexane conversion ratio that is achieved by the invention of independent Claim 1 by "by catalytic cracking of hydrocarbon material characterized in employing a catalyst comprising a penta-sil zeolite comprising one or more rare earth elements and at least one of manganese and zirconium".

Thus, any *prima facie* case of obviousness is based on the cited prior art is rebutted.  
Therefore, the rejection under 35 U.S.C. § 103(a) should be withdrawn.

Claim 1 is rejected under 35 U.S.C. § 112, second paragraph. To obviate the rejection, Claim 1 is amended by replacing "zeolite of penta-sil type" with  
--penta-sil zeolite--.

In view of the foregoing amendments and remarks, Applicants respectfully submit that the application is in condition for allowance. Applicants respectfully request favorable consideration prompt allowance of the application.

Should the Examiner believe that anything further is necessary in order to place the application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned attorney at the telephone number listed below.

Respectfully submitted,

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Attached: Declaration Under 37 CFR 1.132